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## ANTENNARIA IN THE MIDDLE WEST.

By EDWARD L. GREENE.

The prairie region of the Middle West I roughly estimate to be about three times the area of New York, Pennsylvania, New Jersey and the six New England States combined. Concerning the antennarias of that eastern region the botanists of all the generations preceding ours knew so little that we may call it nothing at all and not be far wrong. Only recently have eastern botanists begun really to look at the plants; and to find that they have there a dozen easily definable species where the forefathers had but one. This being true in the little field of the East, much more probably shall we find even now the knowledge of Middle Western antennarias to be scanty, seeing that this field is of such vast extent, and the critical students of systematic botany resident there are so very few.

Such knowledge of the botany of the prairies as a botanically minded school boy may have, I had acquired about a half-century ago, and in recent years I have made several rather extended vacation tours through various parts of the Middle West, always studying the antennarias on the ground, and making specimens. Several collectors in various prairie states have gathered them, and there are some scores of sheets in the herbarium of the National Museum which have been so acquired, and altogether it seems quite time that some kind of a census should be made of all that we seem to have been able to gather and to distinguish in the middle-western membership of the genus. Such a census can hardly fail to stimulate to more active investigation.

I entertain no hope of being able confidently to refer to one or another of the dozen or fifteen clear species of the Middle West all the several scores of herbarium sheets existing in my own

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\* June 10, 1911.—Pages 73 to 96.

large antennaria bundles and those of the National Museum. Not many, if indeed any of the collectors are aware of the urgent need there is of searching for and gathering the male plants—often so very scarce—as well as the female; and in consequence, we have scores of sheets of specimens showing female plants only; and the species are not few of which the characters reside not at all in the female plants, but are pronounced enough in the males. In view of these facts, not a few specimens well chosen and carefully prepared occur in the collections, even some with both sexes represented, which I do not venture either to refer to species already described, or to name and characterize as new; but I make mention of several such, adding some informal account of their peculiarities, thus inviting those in the field to further study of them. It is also with such an end in view that, in the case of common and widely dispersed species, I cite with unusual fulness the stations which the herbaria show for them.

It is hoped that the following attempt at a key to the species may be found helpful.

Leaves small, 1-2 in. long, narrow.

Leaves with some distinction of blade and petiole.....1. *A. neodioica*.

Leaves with little or no distinction of blade and petiole.

Mature leaves glabrous above.

Fertile plants tall; scale tips broad, entire;

sterile plants low.....2. *A. neglecta*.

Fertile plants not low, but the sterile taller;

scale-tips erose or fimbriate..... 4. *A. erosa*.

Fertile plants tall, the sterile low; scale-

tips coarsely notched.....5. *A. longifolia*.

Mature leaves hardly, or very tardily glabrate above.

Scales of fertile involucre narrow, their tips

very narrow.....3. *A. Wilsonii*.

Scales of fertile involucre broad, their tips

broad, obtuse.....6. *A. nebrascensis*.

Leaves of smallest size,  $\frac{1}{2}$ -1  $\frac{1}{4}$  in. long, not more than twice as long as wide.

Leaves obovate-spatulate, glabrous above even when young.....7. *A. campestris*.

Leaves very short, round-obovate, hoary above even in age.

Plant hardly stoloniferous.....8. *A. parvula*.

Plant conspicuously slender-stoloniferous.....9. *A. Lunellii*.

Leaves large, 2-4 inches long including a distinct narrow petiole, the blades  $\frac{3}{4}$ -2 inches wide.

Scales of fertile involucre narrow, not showily scarious-tipped.

Scales few, subequal; pappus-tips in male subserrate.....10. *A. umbellata*.

Scales many, well imbricated; pappus-tips in male crenate.....11. *A. mesochora*.

Scales of fertile involucre broad, with broad showy tips.

Pappus-tips in male narrow, serrate.....12. *A. occidentalis*.

Pappus-tips in male wide, crenate.....13. *A. calophylla*.

1. *A. NEODIOCIA*, Greene, Pitt. iii. 184 (27 May, 1897). I meet with no specimens of this from anywhere to the westward or southward of southern Michigan. In Elias Nelson's distribution it occurs as collected by the late C. F. Wheeler about the Agricultural College, Ingham Co.; also Mr. Charles K. Dodge of Port Huron has sent it out from North Point, Alpena Co.; these specimens uncommonly tall, but the leaves not large. This is from well northward in the southern peninsula. The most southernly and at the same time the most westerly station I have for it is St. Joseph, on the shore of Lake Michigan. I gathered it there myself, in company with Dr. Nieuwland, 27th of May, 1909. Just beyond the suburbs of that city we found it in a piece of rather low meadow at the base of a hillock. The specimens are smaller than usual. No male plants of this are known to me from anywhere in the West.

2. *A. NEGLECTA*, Greene, Pitt. iii. 173 (19 of May, 1897). This, the first new antennaria to have been added to the flora of eastern North America since Linnaeus, has proven the forerunner of many more that have since been given recognition and publication, partly by myself, and partly by others who felt the force of my initiative and were constrained to follow it.

Under the rather extended limits which I seem obliged to concede to the species it has a wide range; for from Maryland and Virginia it occurs northward to Maine and eastern Canada, thence westward to the Mississippi River, if not a little beyond it. Exceedingly different environments are embraced within such empires of territory as are thus circumscribed as one; and *A. neglecta* wears in some parts at least of Maine, New Hampshire and Vermont, aspects that do not harmonize well with that of the plant as seen in the mild Potomac Valley. Also on the remote and very diverse region of the prairies the species wears almost

everywhere a somewhat different dress. It is often much reduced in size, and everywhere there is a peculiar whiteness to its herbage due to a greater density and whiteness of its woolly indument. Very commonly, too, it grows on elevated and even somewhat sandy or gravelly knolls, rather than in such low and even moist pasture lands as it is apt to choose in New England and southward. On the eastern edge, however, of the prairie country, the plant is so little unlike that of Pennsylvania and Maryland, that one is constrained to let it pass for the same; and the transition to the more differentiated white form of northern Illinois, southern Wisconsin and eastern Iowa is gradual; meanwhile one discovers little in the inflorescence or floral characters to mark the plant as specifically distinct. The large number of herbarium sheets before me are mostly of rather poor material; but the enumeration of them, with the special localities, may be of service to those in the field, and may incite some to better field work than has yet been done in this direction.

MICHIGAN. O. A. Farwell, Detroit, 14 May, 1898; a single pistillate plant very stout and low, only 3 inches high, cluster of 6 large heads, labelled *A. campestris* by Mr. Farwell, certainly not that, yet hardly referable to *A. neglecta*. Also "Woods in Detroit," 19 May, 1907; sheet of 7 specimens, 5 fertile all too stout and low for good *A. neglecta*, leaves too large and long. Again "Open fields, Detroit," 14 May, 1898; 4 specimens, one male, all slender, the male with inflorescence dead and dry, the females barely past flower, all this normal western *A. neglecta*, that is, not as tall, more whitened than the eastern. Lastly "Moist-sandy places near Ypsilanti," 16 May, 1901; plants all male, passing out of flower.

Charles K. Dodge. Port Huron, 18 May, 1901; quite slender normal western form, female and male.

Edw. L. Greene. Marengo, 22 May, 1902; 4 specimens female and male, all so nearly matching those collected by me in the District of Columbia in the year that I published the species, even to the racemosely arranged heads, that I can not doubt the identity of the two. Also this is the only really good sheet of this plant which I have seen from the West. The majority of collectors gather and send out such miserable stuff, that he who is long used to be perplexed by the scraps and fragments, will be apt to use his opportunity when in a new field by making

such specimens as really show what a plant is like.

ILLINOIS. Royal A. Dixon and L. Cornelia Gage, Morgan Park Ridge (Chicago), 15 May, 1907; 5 specimens, all male, rather small and young. Mrs. Agnes Chase, "Low prairie west of Harlem," Cook Co., 17 May, 1900. V. H. Chase, "Sterile prairie near Wady Petra," Stark Co., 8 May, 1900. These two sheets by the collectors Chase, from northern Illinois exhibit both male and female plants, the latter unusually stout and low, the former uncommonly tall, and are farther from the norm of the species in this particular than are any others seen.

Philip Price, Wilmette. "Sterile banks"; no date whatever, not even the year; the specimens female, and typical for the West.

Charles P. Johnson (Freeport). "Open clayey hillside, Sciota," 1 May, 1899. Specimens so stout and low, also so much whitened as to the leafy stolons, that one is loath to record them as belonging to the species. Also by Mr. Johnson, the same year "Sandy barren west of Ottawa," 10 May; three specimens, all female, are as tall as the tallest of eastern plants, the involucre in all the examples—there are seven on the sheet—as much racemose as one ever sees them, and this is almost an exceptional phase of the western plant.

F. E. McDonald (Peoria). "On gravelly dry knolls, Peoria," 9 May, 1901; sheet of 4 female and 3 male specimens, representing the southern limit of the species for the Middle West, as far as my own herbarium and that of U. S. Museum have to show; but the plants are too far from typical. The scales of the involucre are too few and their white tips too much reduced, and the pappus-bristles in the male plant are not only more evidently thickened at tip, the tips are neither serrulate nor barbellate, but appear as if quite smooth under a hand lens of low power. There is ground for a suspicion that this Peoria plant may yet claim the rank of a species.

While passing from Illinois to Wisconsin and Iowa I remark that our herbaria in Washington have nothing by which to prove the occurrence of *A. neglecta* in either Indiana or Ohio; but it must be found in the northern parts of both.

WISCONSIN. The oldest specimens of anything called *A. neglecta* which are now before me were collected by myself, at Albion, Dane Co., 12 May, 1862. The sheet contains two good

specimens, male and female. They seem hardly referable to the species. Several points of divergence are manifest. They are stout and low, and the two sexes of about the same height, the male  $2\frac{3}{4}$ , the female  $3\frac{1}{4}$  inches. Both are at the same stage of development as to flowers. The involucre is larger, and those of the female are not darkened at all as to the lower part of the scales. The pappus of the male is quite like that of Mr. McDonald's Peoria plant; yet in other particulars that and this are rather dissimilar. At Dodgeville, 20 June, 1898, I collected what is probably quite typical western *A. neglecta*, the stems slender, 9 or 10 inches high, the heads racemose, their scales dark as usual.

Gilbert Random, Oshkosh, 4 May, 1896, reports "sterile knolls" as the habitat, and the two plants, female, are for the West typical.

IOWA. Mr. C. R. Ball collected at Ames, 18 May, 1897, and at Marshalltown, 15 May, 1897, good plants male and female of the most hoary state of the species, the soil and environment not being mentioned.

R. E. Buchanan gives "Open prairie" as the habitat of specimens made by him, 10 May, at Ontario in the State, 1902. They are quite like those of Mr. Ball.

3. **A. Wilsonii.** Habitu et mensura *A. neglectae*, sed folia et breviora et latiora, tomento faciei superioris vix deciduo. Capitula majuscula, interdum distincte subracemosa, plantae femineae involucri squamis omnibus angustis, summitate angustissime scariosis, maris squamis obtusissime obovatis, summitate inaequaliter dentatis. Pappus maris apice paullulum incrassatus et obscure sub lente crenatus.

Collected "Near Cold Creek, Hamilton Co.," Indiana, 18 April, 1892, by Guy Wilson; specimens in my own herbarium and in that of U. S. Museum. In several of the male specimens the heads are loosely racemose, a thing never seen in *A. neglecta*, or in any other species whatever. The short broad leaves, from which the woolly indument is seldom wholly deciduous, and the peculiarities of the involucre in both sexes, compel the recognition of this plant as a species. It is from central Indiana, and the collector remarks that it is rare.

4. **A. erosa.** E grege *A. neglectae*, sed folia majora, submembranacea, apice obtusissima, infra medium abrupte angustata. Capitula utriusque sexus pauca, in summo, caule confertim sub-

sessilia. Squamae involucri plantae femineae latiusculae apice subtruncato eroso-lacerae, aut interdum fere pectinato-fimbriatae; maris late obovatae, interdum retusae, leviter eroso-dentatae.

Prairies of Marion Co., southern Illinois, collected only by the writer. The oldest specimens are of the year 1898, taken near Sandoval, 12 June, 1898. At this date in southern Illinois, spring is past, and nothing remains of antennarias but the fully formed and mature stolons with their foliage. I made specimens of these leafy stolons, for the foliage was clearly that of no species I had seen before. Then eleven years later, being again in the region in the beginning of May, 1909, I obtained the fine flowering specimens of both sexes, which answer to the diagnosis given above. As an ally of *A. neglecta* this one differs from all others known in this one other particular, that the male plants are distinctly taller than the female, their average height in the specimens before me being 6½ inches, that of the females 5 inches; also the two come into flower at the same time. The habitat of *A. erosa* is not the low and level prairie. It occupies the northward slopes slight elevations toward the woodland borders between Odin and Sandoval.

5. ***A. longifolia***. Habitu praecedentis sed folia longiora, usque bipollicaria et ultra, infra medium magis attenuata, perinde quasi subpetiolata. Capitula plantae femineae in modum *A. neglectae* subracemosa. Pappi setae maris apice vix incrassatae.

Known only from western Missouri, from which region it has been distributed to herbaria by B. F. Bush and by K. Mackenzie, chiefly from within the limits of Jackson County. These collectors have usually sent it out with only the generic name on the labels, as if it had not been found identifiable with any published species; yet n. 12 of Mr. Bush, as distributed from Grain Valley, of May 7, 1899, he had labelled *A. neodioica* as to the female plant, while the male (his n. 6) from the same place and of the same date, is labelled *A. campestris*; nor is this all which the labels bear. That for the female plant informs us that it is "common in woods," that of the male says, "common on prairie." Neither of the sexes bears any likeness to either *campestris* or *neodioica*. Very fair specimens of plants of both sexes were distributed by Mr. K. Mackenzie, in 1899, from Hickman's Mills, the male from "Sandy woods," the female from "dry prairies"; so that, as we should suppose, the two sexes grow



together both in woodland and on prairie. Mr. Mackenzie did not assign any specific name to his plant as distributed, but in the Flora of Jackson County it appears under the name *A. campestris*, but, with Mr. Rydberg's description of that very different species altered as to height of stem and length and shape of leaves—and very much altered, too—so as to let this tall long-leaved plant into the book under that name.

6. **A. Nebrascensis.** Affinis *A. neglectae*, sed folia dimidio minora, superne multo magis tomentosa, indumento tardius evanido vel interdum, ad margines praecipue, permanente. Pedunculi plantae femineae 5-unciales; capitula 5 in summo pedunculo subsessilia; squamae basi fuscae, apice lacteae, obtusae, integrae.

Species known only from near Hershey, in western Nebraska where they were collected by Mr. C. D. Mell, 5 May, 1903. The specimens are excellent, though of the fertile plant only. The habitat lies quite beyond the region of low alluvial prairie, and is really on the eastern slope or verge of the arid Rocky Mountain plains; and the plant shows the influence of its environment in a foliage that is of but half the size of that of eastern *A. neglecta*, all the herbage quite hoary with the fine close tomentum which is far from being deciduous altogether from the upper face of the foliage. The basal and herbaceous part of the involucreal scales is very dark in comparison with the same in even the more properly midland and prairie phase of *A. neglecta*. The male plant though unknown, is probably no rarity; but the locality for the species is remote from all centers of botanical field work.

7. *A. CAMPESTRIS*, Rydb. Bull. Torr. Club, xxiv. 304 (July, 1907). Doctor Rydberg when publishing this fourteen years ago reported it as occurring only beyond the Mississippi, and there is before me now no specimen that brings the range of it to the hither side of that river. It is almost a thing of the elevated Rocky Mountain plains. In view of a fair sheet of six specimens in U. S. Herb., collected and distributed by the discoverer of the species there appears a troublesome discrepancy between these and the description; for that attributes to the species leaves which in age are glabrate above. This character holds good of two specimens out of the six, but of the four it is not true; for in their young and not half grown state they have not a trace of any pubescence of their own. When I say of their own I have reference to this, that all around their edges there is seen a narrow line

of white which, on close inspection, is found to belong to the lower face of the leaf which is to that degree rolled in at the margin before its full expansion. Now it can not be allowed in *Antennaria*, as we have been learning its characteristics these last fifteen years, that the same species, on the same spot—or in different localities, for that matter—shall appear partly with foliage perfectly glabrous above from the start, and partly with this hoary above with a wool that is deciduous; and this is the case in two of the well developed plants on what is a part of the type material of *A. campestris*. Out of this difficulty I am helped by two other sheets in the U. S. Herb., the numerous specimens on which are all from the Black Hills of South Dakota, the same region where Dr. Rydberg collected his specimens. One of these two bears specimens of two species, the other as many specimens all of one kind, without admixture of any even doubtful *A. campestris*.

8. **A. parvula.** Planta pumila, caule 1–3-unciali. Folia semiuncialia, saepissime ovalia, interdum suborbicularia, utrinque incano-tomentosa. Capitula pro planta magna, pauca, subsessilia. Pappi setae maris apice vix incrassatae, scabro-serrulatae.

Black Hills, South Dakota, near Fort Meade, collected by Dr. W. H. Forwood in 1887; seven specimens on U. S. Her. sheet 317207, three of them fertile, the rest sterile. Also by the same collector, and mounted on sheet 317750, fine specimens of *A. parvula* and two of the plants with leaves green and glabrous above, to which it seems best to have the name *A. campestris*.

The distinctions between the two are not merely those of the permanency of the indument. This is not even tardily deciduous from the upper half face in *A. parvula*, while as already affirmed, in the other it does not at all exist at any stage of the half's development; but the leaves in *A. parvula* are so short as to appear almost orbicular now and then; and while the pappus in its male is almost filiform at tip, and mostly barbellate, that in *A. campestris*—not mentioned in the original description—is very obviously thickened as well as quite smooth, or at best faintly crenulate.

9. **A. Lunellii.** Planta pumila, caule vix biunciali, stolonibus elongatis crebre foliosis. Folia latiuscula, semiuncialia et ultra, interdum fere uncialia, spathulato-obovata, superne leviter sericeo-tomentosa, indumento vix, vel tardissime deciduo.

Capitula pauca, magna, sessilia. Pappus maris apice levissime incrassatus barbellulatus.

Collected at Leeds, North Dakota, 7 May, 1902, by Dr. J. Lunell, and by him distributed for *A. campestris*. From both that and *A. parvula* this differs very materially in a number of particulars. At its flowering time it has beautifully leafy stolons as long as the stems are high. The character of the indument is entirely different from that of either, and so also is the form of foliage.

Having here transcended my proper limits and taken up this one species belonging to the region north of the headwaters of the Mississippi, and which is more properly a part of the vast system of steppes of the Canadian Northwest, I might be expected to go further and take into this census other antennarias of North Dakota; but I shall leave the summing up of those to the resident botanist, Dr. Lunell, in hope that, with the handsome little *A. Lunellii*, added to the list, he will soon give us the enumeration of them, with what is always desirable, field notes on their habits and associations.

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Entering now upon the consideration of the group of larger species with broad and petiolate leaves we encounter difficulties. In the eastern parts of the United States where these species abound a few of them are of such marked vegetative characters as to be recognized at once in either the fertile plant or the sterile. In the greater part of the group the fertile plants are so very much alike that the species is hardly distinguishable until you have also the sterile plant, and very interesting is the fact that these male plants are very plainly different in the different species, when the females are with difficulty distinguishable by the most expert. The discouraging circumstance, however, is this, that in certain cases the sterile or male plants of a species are exceedingly rare, so that one may search a township or a county wherein a species is abundant without finding a male plant at all. Just how many species of this section of *Antennaria* there are in the Middle West will therefore not soon be ascertained; but at present we safely list, because able readily to define, a small number.

10. ***Antennaria umbellata*.** Planta feminea saepissime pedalis, caule tenui summitate capitulis 5-9 tenuiter pedicellatis

et sub-umbellatis coronato. Folia biuncialia, lamina late elliptica petiolo aequilonga, superne primum levissime villosa-tomentosa, dein glabra. Involucrum late-campanulatum; squamae angustae, subaequilongae, apice angustissime et vix conspicue scariosae. Planta sterilis fertili dimidio minor, ejus capitula 3-5 subsessilia; pappi setis apice manifestim dilatatis subserratis.

This fine species was discovered by the writer, in company with Dr. Nieuwland, in the vicinity of Benton Harbor, Michigan, 27 May, 1909, the special habitat being the crown of an open hill jutting forth from a piece of woodland, the exposure being northward. The fertile and sterile plants were growing together; but from the fertile alone the species is easily distinguishable from all others of this broad-leaved group. Its heads are slenderly pedicellate, and form usually a loose subumbellate corymb. The scales of its involucre are very narrow and not manifestly imbricated, being of nearly equal length, in this differing from, I think, every other antennaria known, and the scarious tips of the scales, being narrow and little elongated are nearly as inconspicuous as those of *A. mesochora*. The plant will be found in other localities of southern Michigan and northern Indiana when once the exploration of the region for antennaria shall be carried forward beyond what are hitherto its first beginnings.

11. *A. MESOCHORA*, Greene, Pitt. v., 111 (28 Aug. 1903). A full statement of the characteristics of this species may be found at the place cited, and need not here be repeated. I do not yet see reason for altering it in any particular. It pictures the plant as I found it in the middle of May, in Southern Michigan, nine years ago, and as others may find it still, no doubt. I first saw the plant while passing patches of it on a railway train near the station of Marengo. With what was my thorough familiarity with the large-leaved species of the East, I could see that this was none of them. For one of the tall species it was remarkable that it should grow in small but rather compact tufts or clumps. The male plants were common, so that I saw many of them. This is not true of any large Eastern species. Nor were the males at all like those of any known Eastern species. Finally, this was a prairie plant. This is an environmental, an ecological consideration, and a forceful one in all reason, though the untravelled neither heed nor even realize its meaning.

My first specimen of *A. mesochora* were made on hills overlooking Lake Goguac near Battle Creek, 19 May. Three days later I stopped for a day at Marengo, not far from the other locality, and gathered for my herbarium some of the same plants I had seen before from the passing train. Long before then experience had taught me how to make serviceable specimens in antennaria. If others, even those resident in the West had taken pains to make anything like fair specimens we should now have been able to give some account of the further range of the species beyond the limits the one county of Calhoun where the type specimens are found. As things are we have not very much to definitely add in relation to its distribution.

MICHIGAN. Two years before my discovery of *A. mesochora* it had been collected for E. Nelson's distribution by the late Prof. C. F. Wheeler at the Agricultural College near Lansing. Four sheets of this plant are before me, aggregating 10 specimens, 8 of them fertile. The two sterile ones are feeble and poor. Perhaps they were not sought with any attention. The two show well the marks of the pappus in the sterile plant. The fertile plants also, all but two or three, are indifferent. The one really good one is a fertile specimen on U. S. Herb. sheet 390134. On the same sheet is a second specimen, at a much earlier stage, belonging to some other species. In all the rest of these specimens the scales of the fertile involucre are rather too broadly and conspicuously white-tipped.

More remote from my original stations, but on the same parallel, in the extreme western part of Michigan and within sight of the shipping of Lake Michigan at Benton Harbor, I collected again in 1909 a perfect type of this species in the two sexes, this on May 27. The plant was common at that point; and it was later in the day, and in a different spot, that I detected *A. umbellata* described above.

Mr. Charles K. Dodge, for the Nelson distribution collected some large fertile plants at Algonac on the eastern edge of the State which I wish I could refer to the present species, and the more because *A. mesochora* is manifest on the other side of the St. Claire River in Ontario; but the involucre in these Algonac plants are wrong for the species. Their scales are too little imbricated, their tips too broad and conspicuous, and they show a tinge of flesh-color. It is to be hoped that the well known zeal

of Mr. Dodge will impel him to investigate this plant, and find if possible the male of it.

Mr. O. H. Farwell sent me from Detroit in 1879 a fertile plant to which I could assign no name. I can not now with any confidence refer it to *A. mesochora*, the tips of its bracts are too broad and conspicuous. Good specimens taken at the right time, and of both sexes, are in requisition from about Detroit.

ONTARIO. Professor John Macoun in 1901 sent me good fertile specimens of this species from extreme western Ontario; one from "Pastures at Leamington, Lake Erie," and one from "Point Edward, Lake Huron." From as far to the eastward as Saint Catharines some one whose name does not appear gathered antennarias for the A. Nelson distribution, some of them fair, most of them poor, many sheets of which were issued under the name of my *A. ambigens*, though none represent it. The best sheet before me of this St. Catharines material, U. S. Herb. n. 390130, I should like to refer to *A. mesochora* on account of its involucre scales being as narrow as in that, and almost as slightly white-tipped; but the plant is rank. Its heads are much too large and are loosely corymbed. Moreover the scales themselves are almost as little imbricated as in the small plants published above as *A. umbellata*. The sheet next to this in U. S. Herb., n. 390131, from the same place, has two small male plants. They are insignificantly small by the side of the female plants of the other sheet. The heads are but four and are sessile. The pappus in these male flowers is that of *A. mesochora*. Should these two sheets of the distribution be proven to be mates, i. e. to represent one species, then there would be no doubt about the necessity of receiving it as a new one. But as I said before, this anonymous gathering from St. Catharines', all of it sent out under the wrong name, is altogether a sad mixture of things utterly dissimilar.

INDIANA and ILLINOIS. I should, I think, be sure of finding *A. mesochora* in northern Indiana, especially eastward, and near the Michigan boundary, but most of those sections are little or not at all explored botanically, and I have no record to make, from the goodly number of herbarium sheets at hand, of this species for Indiana. As one follows the southern shore of Lake Michigan around, across the northwestern corner of Indiana and into northeastern Illinois, both soil and climate change notably;

the environment is no longer that of the prairies of south-central Michigan, but something very different. We have antennaria material—some of it excellent—from those districts suburban to Chicago in both states, but no *A. mesochora*; or at least none that is at all genuine.

WISCONSIN. Passing northward along the lake shore, the low and almost swampy-prairie region on which Chicago and its suburbs have been builded are left behind, and one traverses there in southern Wisconsin, just opposite southern Michigan, again a region of elevated and rolling prairie. Except as being to the windward of Lake Michigan, and therefore notably colder in winter than southern Michigan, the environment is the same in the two, and here in Wisconsin we might expect *A. mesochora*. Unluckily I have access to little evidence in this case. Botany is long since moribund in Wisconsin and some other neighboring states; and good specimens of Wisconsin plants if found in herbaria, are mostly such as were gathered by earlier generations. In 1898 I made near Dodgeville and as late as 20 June—which is too late—specimens of a large antennaria “gone to seed”; but the involucre, not yet withered, are those of *A. mesochora*, and the stature of the plant, also its foliage and general aspect are those of that species. No male plant was seen.

12. *A. OCCIDENTALIS*, Greene, Pitt, iii. 322 (21 May, 1898). Readily distinguished from *A. mesochora* by a stouter habit, a more herbaceous texture, a less imbricated involucre the scales of which have rather wide and conspicuous white tips, and the pappus of the male showing but little flattened and distinctly serrate bristle tips. This does by no means express all which the botanist, with botanist's trained and experienced eye sees by which we know this plant of the southerly prairie region as something other than its northern congener. Apparently the sterile or male plant of *A. occidentalis* is as rare as that of *A. mesochora* is common; yet the oldest specimen of *A. occidentalis* that I have seen, as well as the only one I knew of when first describing the species is a sterile one collected by myself as long ago as 1867. That I gathered only the male plant at the time may well indicate that I did not see the other. The mansion of a Chicago millionaire and its spacious grounds and gardens long since came to occupy the site where I gathered my specimen forty-four years ago. The habitat was an open low sunny hill top just outside

a woodland border, the woodland strip narrow, skirting the banks of the Sangamon River, in Piatt County a few miles southward from Monticello. The best sheet of fertile plants yet seen by me was that I might have named as the type which I had from H. A. Patterson of Oquawka as long ago as 1874. He obtained it near Oquawka in that year. I have never had any doubt that his fertile and my sterile are of one and the same species.

Being in Monticello in May, 1909, I followed the north bank of the Sangamon in the direction of my original but now obsolete station for this species, but with the result of finding along those sunny bluffs plenty of fertile plants in good condition but not a sterile one. The next best showing of sterile *A. occidentalis* known to me is from Marshall County, a part of the same physiographic region to which the County of Piatt belongs. This is a sheet (U. S. Herb. n. 645268), of two specimens gathered by Virginus S. Chase, 19 May, 1907, from "Rich woods along west fork of Senachwine Creek." I do not like "rich woods" for the habitat of my *A. occidentalis*, for, while it is not a prairie plant such as *A. mesochora* is, the environment of rich woods is not that open knolls bordering woods and where the soil is not rich but clayey rather. Mr. Chase seems not to have gathered the larger fertile plants; but as for the male pappus in these specimens, it is perfectly that of the present species, though the stems are quite slender; something that might be due to the shade in which they are by implication said to grow. The fertile individuals of this plant are needed for the settlement of the question of its precise identity. Probably we have it, and from Mr. Chase, from another station also in Central Illinois, and gathered six years later than the males just mentioned. The sheet that holds the two specimens is 434360. It is E. Nelson's distribution n. 533; is described as having grown, "On a clayey slope near Princeville, Peoria County." That agrees well with the habitat of *A. occidentalis* at the place where I obtained first. The specimens match perfectly my specimens from the hills sloping to the Sangamon; the two localities not only belong to the same geographic tract, but are not more than 75 or 80 miles apart. Indeed there is not the least doubt that Mr. Chase's fertile plants from Princeville are perfect *A. occidentalis*. But that his male plants of the earlier year belong here seems improbable; and nothing but specimens of the other sex from that rich woods station can help to the settlement of the question.



An interesting series of specimens is in U. S. Herb., taken from a "Sandy barren west of Ottawa" by Mr. Charles P. Johnson of Freeport, Ill., 10 May, 1899. The specimens fill five herbarium sheets and number fourteen, six of which are fertile, and themselves alone considered would pass for *A. occidentalis*; but the eight sterile specimens which from a part of the series are most plainly, even glaringly, of two kinds. Of normal male specimens there are but two, and six are something else; yet I have no doubt that the three phases—male, female and neutral, I shall call them—are of one species. During at least ten years past I have been aware of the existence of a certain occasional trimorphism. The occasional third form, while showing more likeness to the male than to the female, is in aspect intermediate; always taller than the male, its involucre longer, yet with scales equal in length and their tips distinctly more narrow and elongated, yet always obtuse, just as those of all male plants are obtuse; and the pappus-bristles, while never flattened, are coarser at summit and barbellate. I have seen them in Maryland, and in the District of Columbia, in perfect maturity shedding their abortive achenes, throwing them off to be scattered by the winds quite after the manner of the fertile plants. I suspect that if I had eyesight to study these occasional third forms in flower I should find them to be in some imperfect way bisexual, or hermaphrodite as to the individual flower. Nevertheless, with a mere hand lens I have been able to see that the pappus these plants give to the winds carries no achene, but only an empty shell. The fact of this trimorphism of course increases the difficulty which this genus presents to the student. If it should happen that the phase which I call neutral should in some places present itself along with the female colony to the total exclusion of the normal male, it might be taken by the inadvertent for the real male, and lead to the propounding of false species.

KANSAS. In the original account of *A. occidentalis* it was noted that it seemed to occur westward to Kansas. Nothing more is known of the plants at the time I wrote. The specimen I had from Kansas at that time is again before me. It is a fair pistillate plant, from "Woods, Pottawatomie Co.," by A. S. Hitchcock and may well be this species, as far as one sex alone can enable one to determine.

MICHIGAN. Among antennarias gathered in Ingham County by the late Professor Wheeler for Elias Nelson there is one sheet in U. S. Herb. (n. 494963) which Mr. Nelson called *A. occidentalis*, and I can not gainsay the identification; but the three plants on the sheet are all fertile. Also they are small and slender for this species; but by their involucre they are far removed from *A. mesochora*. The discovery of the sterile plant might easily, I suspect, prove the existence there of a species not now definable.

INDIANA. Dr. W. S. Moffatt of Chicago seems to have obtained fine fertile specimens of the present species from the "Border of a thicket" somewhere in Lake County, 29 May, 1879. They are on sheet 327217 U. S. Herb.

Collected by myself near Knox, in May 1909 is a species about which I am much in doubt. The pappus of the male is that of the present species. The involucre of the female is not, nor is it any more nearly that of *A. mesochora*. In stature the plants are somewhat smaller than in either and there is less disparity between the males and females as to size. In two stations I found the plants on gravelly knolls along the railway, the land never having been under cultivation. This part of Indiana was originally not prairie land but timbered, at least mainly. I insist on making mention of these ecological considerations because they are always significant to the mind of every travelled and experienced systematic botanist; this notwithstanding the fact that the mere dry-herbarist, the closet botanist, always makes light of them, but for reasons too manifest to require mention.

Farther northward still in Indiana, namely at South Bend, I met with a large woodland antennaria which, as seen at first in the fertile plant only, I should have referred without much hesitancy, to *A. mesochora* but for the fact of its woodland shade habitat. The Studebaker Woods, as they are called, are rather low and moist in the main, and although this antennaria grows on elevated ground in the shade of upland oaks, yet do these elevated shades fall short of being dry woods. Had the first been a young growth, and had *A. mesochora* been found in the open country around South Bend, I should have been ready to say to myself that these alsophilous plants were a survival from the time when these elevations were treeless and open to the sun and wind. But the forest is a hundred years old if not a thousand, nor did I find a trace of any large-leaved antennaria in all the

open country round about. Repeated searches in the Studebaker woods were rewarded by the discovery of a number of individuals that were sterile. I think I gathered the few I found. To my dismay I now find that they are not the males of either *A. mesochora* or *occidentalis*, not even right males at all. Their elongated involucre and undilated pappus-bristles declare them to be of that third phase, the neutral or the false-hermaphrodite one, of which mention is made above. If the real male plant shall come to light, either from the woods named, or, along with the female, from elsewhere, then may we hope to ascertain what the species is.

It is evident that not all the large-leaved plants of the prairie region can be distributed between the two species last named; but with the scanty materials at hand representing too imperfectly one or two species, perhaps yet to be made out, nothing more can be done.

A. CALOPHYLLA, Greene, Pitt. iii., 347. (27 Sept. 1898). Readily known at whatever stage of growth by the great dimensions of its foliage, the largest leaves more than two inches wide and not much longer, of thin texture, and permanently flocculent above. Known only from the limestone districts of southern Illinois and adjacent Missouri; but it should be looked for in similar parts of extreme southern Indiana, which still remains a region botanically unexplored.

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#### IV.—NEW PLANTS FROM NORTH DAKOTA.

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By J. LUNELL.

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During my botanical excursions in this state I have for many years paid a special attention to the multi-variable behaviour of the group of plants, known as *Laciniaria scariosa*, and made efforts to penetrate the secrets governing its remarkable changes. I have also had a splendid occasion to widen the scope of my observations by studying the fine material of Mr. C. C. Deam, secretary of the Indiana State Board of Forestry, who kindly placed it at my disposal, thereby enabling me to confirm my